

Name: \_\_\_\_\_

Key

Section: \_\_\_\_\_

You have 15 minutes to complete the quiz. Please **show all work**, and then **write your answer on the line provided**.

1. Suppose that you take out a credit card loan for \$1,000 at 27% interest, compounded 4 times per year, and that you do *not* make any loan payments.

- 3 (a) How long does it take for the balance of your loan to double?

1 pt { want t s.t.

$$F(t) = 1000 \left(1 + \frac{0.27}{4}\right)^{4t}$$

$$\frac{2000}{1000} = \frac{1000 (1.0675)^{4t}}{1000}$$

$$2 = (1.0675)^{4t}$$

2 pt {

$$\ln(2) = \ln((1.0675)^{4t})$$

$$\ln(2) = 4t \cdot \ln(1.0675)$$

$$t = \frac{\ln(2)}{4 \cdot \ln(1.0675)}$$

$$\approx 2.653 \text{ years}$$

Answer: \_\_\_\_\_

- 3 (b) How long until you owe \$100,000?

1 pt { want t s.t.

$$100,000 = 1000 (1.0675)^{4t}$$

$$100 = (1.0675)^{4t}$$

$$\ln(100) = \ln((1.0675)^{4t})$$

1 pt {

$$\ln(100) = 4t \cdot \ln(1.0675)$$

$$t = \frac{\ln(100)}{4 \cdot \ln(1.0675)}$$

Answer:  $t \approx 17.63 \text{ years.}$  1 pt

Name: \_\_\_\_\_

Section: \_\_\_\_\_

2. Suppose that  $f(x) = 2x + 5$ .3 (a) Compute  $\lim_{h \rightarrow 0} \frac{f(a+h) - f(a)}{h}$ . You must show *all* work.

$$\left. \begin{array}{l} 1pt \\ 2pt \end{array} \right\} = \lim_{h \rightarrow 0} \frac{[2(a+h)+5] - [2a+5]}{h}$$

$$\begin{aligned} f(a+h) &= 2(a+h) + 5 \\ &= 2a + 2h + 5 \\ f(a) &= 2a + 5 \end{aligned}$$

$$= \lim_{h \rightarrow 0} \frac{2a + 2h + 5 - 2a - 5}{h}$$

$$= \lim_{h \rightarrow 0} \frac{2h}{h}$$

$$= \lim_{h \rightarrow 0} 2$$

$$= 2$$

Answer: 2 } 1pt

(b) Explain the graphical meaning of your answer in part (a).

You can use words and/or a labeled sketch.

$$\begin{aligned} &\text{slope of } f(x) \text{ at } a \\ &= f'(a) = \lim_{h \rightarrow 0} \frac{f(a+h) - f(a)}{h} \end{aligned}$$